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*Amanda L. Amato*  
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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of : J. Morando  
For : **ALLOY COMPOSITION SUITABLE FOR  
MOLTEN MAGNESIUM ENVIRONMENTS**  
Serial No. : 09/535,550  
Filed : March 27, 2000  
Art Unit : 1742  
Examiner : Sikyin IP  
Attorney Docket No. : JAM 2 0003  
Cleveland, Ohio 44114

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BOARD OF PATENT APPEALS  
AND INTERFERENCES

Attention: Board of Patent Appeals and Interferences  
Assistant Commissioner for Patents  
Washington, D.C. 20231

Dear Sir:

This Appeal Brief is in furtherance of the Notice of Appeal that was received by the U.S. Patent and Trademark Office on July 30, 2002.

The fees required under 37 C.F.R. §1.17 and any required petition for extension of time for filing this brief and fees therefor, are dealt with in the accompanying Transmittal of Appeal Brief.

Appellant files herewith an Appeal Brief in connection with the above-identified application wherein claims 2-29 and 34 were finally rejected in the Final Office Action of May 22, 2002. What follows is Appellant's Appeal Brief (submitted in triplicate) in accordance with 37 C.F.R. §1.192(a).

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**I. REAL PARTY IN INTEREST (37 C.F.R. §1.192(c)(1))**

The real parties in interest in this appeal are the inventor named in the caption of this brief (Jorge A. Morando) and his assignee, Alphatech, Inc.

**II. RELATED APPEALS AND INTERFERENCES (37 C.F.R. §1.192(c)(2))**

Currently, it is believed that there are no other appeals or interferences in process or pending before the U.S. Patent and Trademark Office which the present application bases its priority from, or any cases which base its priority upon the present application, that will directly affect, or will be directly affected by, or will have a bearing on the Board's decision in this appeal.

**III. STATUS OF CLAIMS (37 C.F.R. §1.192(c)(3))**

The status of the claims set forth after the Final Office Action mailed May 22, 2002 was, and is, as follows:

Allowed: none

Rejected Claims: 2-29 and 34

The present appeal is directed specifically to claims 2-29 and 34.

**IV. STATUS OF THE AMENDMENT (37 C.F.R. §1.192(c)(4))**

An Amendment to claim 28 made on July 22, 2002 after the final Office Action was not entered by the Examiner as raising new issues that would require further consideration and/or search and is not placing the application in a better form for appeal.

The final rejection made in the Office Action of May 22, 2002 was maintained in the Advisory Action mailed August 21, 2002.

**V. SUMMARY OF THE INVENTION (37 C.F.R. §1.192(c)(5))**

The present application is directed to a component of equipment for use in molten metal melts which contain magnesium. The component is formed from an alloy comprising iron, chromium, molybdenum, vanadium, niobium, cobalt, and tungsten and at least one of boron and carbon (page 5, last paragraph)(claim 28). Preferably, the alloy is essentially free of phosphorus and sulfur (page 3, line 29-30)(claims 6 and 7). Preferably, the component is made from an alloy comprising from 0.01 to 2.0 weight % boron, 0.01 to 2.0% carbon, 5.0 to 15.0% chromium, 0.0 - 2.0% silicon, 2.0 to 12.0% molybdenum, 0.5 to 10.0% tungsten, 0.5 to 5% vanadium, 0.5 to 5.0% niobium, and 0.5 to 10.0% cobalt (page 7). Even more preferably, the component is made from an alloy containing 0.20 to 0.30% boron, 0.50 to 0.60% carbon, 0.000 to 0.005% sulfur, 0.000 to 0.005% phosphorus, 10.0 to 11.0% chromium, 0.0 to 0.80% silicon, 6.00 to 7.00% molybdenum, 3.00 to 3.50% tungsten, 2.00 to 2.40% vanadium, 2.80 to 3.20% niobium, 4.00 to 4.50% cobalt and is substantially free of nickel (page 7).

**VI. ISSUES (37 C.F.R. §1.192(c)(6))**

Whether claim 28 is anticipated under 35 U.S.C. §102(b) by JP 63274740; JP 09049051; JP 11293410; or JP 08325673.

Whether claims 2-27, 29 and 34 are unpatentable under 35 U.S.C. §103 over JP 09049051.

Whether claims 2, 4-7, 10-27, 29 and 34 are unpatentable under 35 U.S.C. §103 over JP 08325673.

Whether claims 2-4, 6-13, 16-27, 29 and 34 are unpatentable under 35 U.S.C. §103 over JP 63274740.

Whether claims 2-9, 14-27, 29 and 34 are unpatentable under 35 U.S.C. §103 over JP 11293410.

## **VII. GROUPING OF THE CLAIMS (37 C.F.R. §1.192(c)(7))**

No two or more of the claims at issue, i.e., claims 2-29 and 34 stand or fall together. That is, each claim separately recites patentable subject matter. This is explained in detail below.

Claim 28 from which the remainder of the rejected claims depend recites a component formed from an alloy comprising iron, chromium, molybdenum, vanadium, niobium, cobalt, and tungsten and at least one of boron and carbon the alloy being substantially free of sulfur and phosphorus. Dependent claims 2 to 27 recite the component of claim 28 wherein the alloy contains particular concentrations of one or more of the elements. By reciting these specific concentrations, claims 2 to 27 are separately patentable independent of whether the broader claim or claims from which they depend are patentable. With respect to claims 29 and 34, these claims recite the component of claim 28 wherein the component is a specific piece of equipment or has the specified resistance properties. These claims are also separately patentable based on the fact that they are directed to distinct embodiments of the base claim. These specific arguments for patentability of various claims are discussed herein below.

## **VIII. ARGUMENTS (37 C.F.R. §1.192(c)(8))**

### **A. The Examiner's Rejection of Claim 28 as Being Anticipated by the Art of Record Is Erroneous and must Be Reversed.**

The Examiner rejected claim 28 under 35 U.S.C. §102(b) as being anticipated by JP 63274740; JP 09049051; JP 11293410; and JP 08325673. Applicants respectfully disagree.

The abstracts of the cited prior art refer to an alloy material. They do not, however, anticipate a component compound of an alloy for use "in molten melts which include magnesium" as claimed in claim 28 of the present invention. JP 63274740 is directed to a sintered rocker arm of a V-type 6-cylinder gasoline engine. Such an engine is not intended to contact molten magnesium. JP 09049051 is directed to surface layers of rolls made of iron alloys to improve resistance against heat cracking

and surface roughening without deteriorating wear resistance due to segregation of Ce and B at grain boundaries. JP 11293410 is directed to hardened steel having good mechanical properties. JP 08325673 is directed to rolls suitable for use in hot strip mills. Nowhere do the cited references suggest the use of the alloys for submersion in molten magnesium. The present invention states that it is known that alloys have a relatively short life in such environments because of the destructive effects of the molten magnesium on the components contacting the molten metal (page 1, lines 22-25). The cited references do not suggest an ability to overcome this problem. Accordingly, withdrawal of the rejection is respectfully requested. The Examiner cannot simply assume this claim limitation.

As stated above, the cited abstracts do not suggest the use of the alloys in molten magnesium. Importantly, the Examiner has concluded that claims 28, 29 and 2-27 include limitations to a component of equipment. Moreover, the Examiner separated these claims via restriction from alloy claims. Accordingly, the claimed limitations to a component for use in molten magnesium has already been given meaning in the claims by the Examiner. While it is true that a mere statement of a new use for an otherwise old or obvious composition cannot render a claim to the composition patentable, when that use is unobvious and novel, and claimed, the claim is patentable. It would not be obvious from the cited art that the present invention would have a higher resistance to molten magnesium. Additionally, the claims include in the body “a structure which refers back to, is defined by, or otherwise draws life and breath from the preamble” as required to provide patentable weight. Moreover, the function and/or structure of the component would be clear to one skilled in the art upon reading and understanding the specification. The claimed component does not, therefore, read on the cited references due to the claimed use in melts including molten magnesium.

Here the recited preamble “for use in molten melts which include magnesium,” further defines the structural limitations of the claimed invention. That is, the Appellants recognized that conventional equipment used for moving and

transferring metals in a bath of molten metal have a relatively short life span because of the destructive effects of the molten metal on the components contacting the molten metal (page 1, lines 22-25). This is particularly true with regard to magnesium and magnesium/aluminum baths for refining of magnesium which operate at temperatures up to around 1800°F (page 1, lines 8-10). Here, there is no indication that the references that the Examiner has cited are suitable for use in such environments. That is, not every alloy comprising the components listed in claim 28 would be suitable for use in molten melts that include magnesium. Thus, the claimed preamble structurally defines and limits the claim and patentably distinguishes the present invention over the prior art.

**B. The Examiner's Rejection of Claims 2-27, 29 and 34 as Being Obvious Over the Noted References is Erroneous and Must be Reversed.**

The Examiner has rejected claims 2-27, 29, and 34 under 35 U.S.C. § 103 (a) as being unpatentable over JP 09049051, claims 2, 4-7, 10-27, 29, and 34 under 35 U.S.C. § 103(a) as being unpatentable over JP 08325673, claims 2-4, 6-13, 16-27, 29, and 34 under 35 U.S.C. § 103(a) as being unpatentable over JP 63274740, and claims 2-9, 14-27, 29, and 34 under 35 U.S.C. § 103(a) as being unpatentable over JP 11293410. Applicants respectfully traverse.

The cited abstracts do not suggest the use of the alloys in molten magnesium and, in addition, as the recited components of a molten metal pump. First, while the Examiner has concluded that the limitations of claim 28 are shown in the prior art, it would not be obvious from the cited art that the present invention would have a higher resistance to molten magnesium, and provides exceptional substitution as components of a molten magnesium pump. Claim 28 specifically recites components for use in molten melts. These components do not, therefore, read on the cited references. The Examiner has provided no basis that the materials of the cited JP references would be used to construct Applicants claimed molten magnesium pump components.

Furthermore, with respect to the rejection over JP 63274740, the Examiner states that the claim is anticipated by the reference. Applicants respectfully note that the reference includes a range of 0.5-2.5 wt% for boron. The present invention, by contrast, includes a claimed limitation of B below the range of the Japanese patent. Specifically, claim 4 includes a B range of between about 0.15 and 0.5 wt%. Claim 5 includes a B limitation between about 0.2 and 0.3 wt%. Furthermore, the phosphorus limitation of claim 7 of the present invention, requires much less phosphorus in the present alloy than the less than 0.05 wt% in the Japanese abstract. The Examiner has provided no explanation as to why the skilled artisan would select Applicants' claimed range of each of the recited constituents as opposed to the range disclosed in the reference of record. Accordingly, withdrawal of the rejection is respectfully requested.

With respect to the rejection over JP 08325673, the Examiner has stated that the reference discloses 3-8 wt% vanadium and 0.1-2 wt% niobium, which anticipate the claimed 3 wt% V and 2 wt% Nb in the present invention. Applicants note that the present application actually claims a range of 0.5-3 wt% V (claim 16), less than the lower limit of vanadium in the reference of record, and a range of 2-4 or 2.8-3.2 wt% Nb (claims 17 and 18), both of which are greater than the ranges cited in the reference of record. The Examiner has again provided no explanation as to why the skilled artisan would select Applicants' claimed range of each of the recited constituents as opposed to the range disclosed in the reference of record.

In short, the Examiner cites several instances where the references teach a range of weight percents for the various elemental components of the claimed alloy that touch but do not overlap the claimed ranges. In such an instance, a *prime facie* case of obviousness only exists where the claimed ranges are close enough that one skilled in the art would have expected them to have the same properties *Titanium Metals Core of America v. Banner*, 227 U.S.P.Q. 773 (Fed. Cir. 1985). Here, there is no indication that the alloys disclosed in the cited art would have the same properties as those claimed in the present invention. Specifically, there is no indication that those

alloys would be suitable for use in molten melts which include magnesium. Thus, although the disclosed weight percent ranges may be similar to those claimed, the differences result in different properties in the claimed invention than the alloys of the cited prior art.

Moreover, the examiner states that with respect to the claimed contents of S, P, Si, and Ta, the claimed ranges include zero and the cited reference is thus not required to recite said elements. Applicants respectfully note that the present invention specifies a concentration of less than about 1 wt% Si (claim 10) and less than about 4.5 wt% Ta (claim 22). The reference of record makes no reference to either Si or Ta. Therefore, there is no guidance for the skilled artisan in the reference of record to select or exclude Si or Ta as a possible component of the alloy, or to specify the low ranges. Additionally, the present invention claims an alloy "substantially free of sulfur and phosphorus" (claim 28). The reference of record provides no teaching or explanation that would render this claimed limitation obvious as alleged by the Examiner. Accordingly, withdrawal of the rejection is respectfully requested.

With respect to JP 11293410, the Examiner states that the abstract discloses 0.0-2 wt% Nb and less than or equal to 3 wt% Co. The present invention, by contrast, claims a Nb concentration of about 2-4 or 2.8-3.2 wt% (claims 17 and 18), a range above that of the abstract, and a Co concentration of about 3.0 to 5.0 wt% (claim 20), a range above that of the abstract. Furthermore, the abstract fails to address the S, P, and Ta requirements of the present invention. The Examiner states that the claimed contents include zero and the cited reference is therefore not required to recite the elements. However, Applicants assert that there is no teaching or explanation that would render the above referenced claims regarding S, P, and Ta obvious to the skilled artisan. Accordingly, withdrawal of the rejection is respectfully requested.

With respect to JP 09049051, the reference fails to suggest the sulfur requirements of claim 6, the phosphorus requirements of claim 7, the chromium requirements of claim 9, or the tantalum requirement of claim 22.

**CONCLUSION**

In view of the above, Appellant respectfully submits that claims 2-29 and 34 are not anticipated or rendered obvious by the cited art.

Accordingly, it is respectfully requested that the Examiner's rejections be reversed.

Respectfully submitted,

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Dated: January 30, 2003

  
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**IX. APPENDIX OF CLAIMS (37 C.F.R. §1.192(c)(9))**

2. The component of claim 28 wherein the carbon is at a concentration of 0.4 to 2.0 weight %.
3. The component of claim 2, wherein the carbon is at a concentration of 0.5-0.6 weight%.
4. The component of claim 28, wherein the boron is at a concentration of 0.15 to 0.50 weight%.
5. The component of claim 4, wherein the boron is at a concentration of 0.20 - 0.30 weight%.
6. The component of claim 28, wherein the sulphur is at a concentration of less than about 0.005 weight %.
7. The component of claim 28, wherein the phosphorous is at a concentration of less than about 0.005 weight %.
8. The component of claim 28, wherein the chromium is at a concentration of 9 to 12 weight %.
9. The component of claim 8, wherein the chromium concentration is 10 to 11 weight %.
10. The component of claim 28, wherein the alloy further includes silicon at a concentration of less than about 1.0 weight %.

11. The component of claim 10, wherein the silicon concentration is less than about 0.8 weight %.

12. The component of claim 28, wherein the molybdenum is at a concentration of 5.0 to 8.0 weight %.

13. The component of claim 12, wherein the molybdenum concentration is 6.0 to 7.0 weight %.

14. The component of claim 28, wherein the tungsten is at a concentration of 2.5 to 4.0 weight %.

15. The component of claim 14, wherein the tungsten concentration is 3.0 to 3.5 weight %.

16. The component of claim 28, wherein the vanadium is at a concentration of 1.5 to 3.0 weight %.

17. The component of claim 16, wherein the vanadium is at a concentration of 2.00 to 2.40 weight %.

18. The component of claim 28, wherein the niobium is at a concentration of 2.0 to 4.0 weight %.

19. The component of claim 18, wherein the niobium concentration is 2.80 to 3.20 weight %.

20. The component of claim 28, wherein the cobalt is at a concentration of 3.0 to 5.0 weight %.

21. The component of claim 20, wherein the cobalt concentration is 4.00 to 4.50 weight %.

22. The component of claim 28, further including tantalum at concentration of less than about 1.5 weight %.

23. The component of claim 28, further including manganese at a concentration of about 0.5-1.0%.

24. The component of claim 28, wherein the alloy is substantially free of nickel.

25. The component of claim 24, wherein the alloy includes less than about 0.005 weight % nickel.

26. The component of claim 28, wherein the alloy includes, in terms of weight percent:

Boron	0.01 - 2.0
Carbon	0.01 - 2.0
Sulphur	0.00 - 0.005
Phosphorous	0.00 - 0.005
Chromium	5.0 - 15.0
Silicon	0.0 - 2.0
Molybdenum	2.0 - 12.00
Tungsten	0.5 - 10.00
Vanadium	0.5 - 5.0
Niobium	0.5 - 5.0
Cobalt	0.5 - 10.0

27. The component of claim 26, wherein the alloy includes, in terms of weight percent:

Boron	0.20 - 0.30
Carbon	0.50 - 0.60
Chromium	10.0 - 11.0
Silicon	0.0 - 0.80
Molybdenum	6.0 - 7.0
Tungsten	3.00 - 3.50
Vanadium	2.00 - 2.40
Niobium	2.00 - 2.40
Cobalt	4.00 - 4.5

28. A component of equipment for use in molten melts which include magnesium, the component formed from an alloy comprising iron, chromium, molybdenum, vanadium, niobium, cobalt, and tungsten, and at least one of boron and carbon, the alloy being substantially free of sulfur and phosphorous.

29. The component of claim 28, wherein the component is selected from a pumping member, impeller, bearing, post and shaft.

34. The component of claim 28 wherein the component is resistant to surface dissolution by magnesium in molten metal baths.